

Claims

1. A homeostatic flying saucer comprising:
 - a body housing at least four generally downwardly directed thrusters;
 - an electrical power source operably connected to said thrusters and carried within said body; and
 - a homeostatic control system operably connected to said thrusters to automatically control a thrust produced by each thruster in order to maintain a desired orientation of said saucer, said homeostatic control system including an XYZ sensor arrangement and associated control circuitry that dynamically determines an inertial gravitational reference for use in automatic control of said thrust produced by each thruster.
2. The flying saucer of claim 1 wherein said XYZ sensor arrangement comprises:
 - an X-axis sensor system positioned in an X plane of said body and including at least three first sensors that sense acceleration and gravity in said X plane and at least three second sensors that sense acceleration only in said X plane;
 - a Y-axis sensor system positioned in an Y plane of said body and including at least three first sensors that sense acceleration and gravity in said Y plane and at least three second sensors that sense acceleration only in said Y plane; and
 - a Z-axis sensor system positioned in a Z plane of said body and including at least one sensor that senses yaw in said Z plane.
3. The flying saucer of claim 2 wherein said X-axis sensor system comprises two sets of active accelerometers and two sets of passive accelerometers oriented in said X plane and said Y-axis sensor system comprises two sets of active accelerometers and two sets of passive accelerometers oriented in said Y plane.
4. The flying saucer of claim 3 wherein each set of active accelerometers comprises a pair of active accelerometers oriented at 90 degrees with respect to each other in the respective plane

and each set of passive accelerometers comprises a pair of passive accelerometers oriented at 90 degrees with respect to each other in the respective plane.

5. The flying saucer of claim 4 wherein each of said pairs of active accelerometers and each of said pairs of passive accelerometers are positioned at 45 degrees offset relative to a horizontal plane through a center of said body.

6. The flying saucer of claim 5 wherein said control circuitry includes conditioning circuitry that independently conditions output signals from each accelerometer.

7. The flying saucer of claim 6 wherein said control circuitry includes differential circuitry that independently operably subtracts output signals from said conditioning circuitry for said passive accelerometers from a corresponding output signal from said conditioning circuitry for said active accelerometers to generate a raw tilt value for each of four corresponding pairs of active and passive accelerometers in each of said X plane and said Y plane.

8. The flying saucer of claim 7 wherein said control circuitry includes comparison circuitry that compares a ratio of two of said four corresponding pairs of active accelerometers and passive accelerometers with the other two of said four corresponding pairs of active accelerometers and passive accelerometers to determine a ratio of pairs of raw tilt values from which an effective angle of an absolute position of said X-axis sensor system in said X plane is determined and an effective angle of an absolute position of said Y-axis sensor system in said Y plane is determined.

9. The flying saucer of claim 8 wherein said control circuitry includes accumulator circuitry that accumulates said effective angles over time from which an angular rate of change is determined for each of said X plane and said Y plane.

10. The flying saucer of claim 9 wherein said control circuitry includes second differential circuitry that operably subtracts said ratios of pairs of raw tilt values of each of said X plane and

said Y plane from each of said corresponding output signals of said active accelerometers to generate a raw acceleration cross product vector for each of said active accelerometers.

11. The flying saucer of claim 10 wherein said control circuitry includes processing circuitry that normalizes each of said raw acceleration cross product vectors for each of said active accelerometers in said X plane and said Y plane using the corresponding one of said effective angles for said X plane and said Y plane to generate a normalized cross product vector for each of said active accelerometers.

12. The flying saucer of claim 11 said control circuitry includes second comparison circuitry that compares a ratio of said normalized cross product vectors of two of said four corresponding pairs of active accelerometers with said normalized cross product vectors of the other two of said four corresponding pairs of active accelerometers to determine a ratio of normalized cross product vectors from which an effective magnitude of a true horizontal acceleration and a true vertical acceleration of said X-axis sensor system in said X plane is determined and an effective magnitude of a true horizontal acceleration and a true vertical acceleration of said Y-axis sensor system in said Y plane is determined.

13. The flying saucer of claim 1 wherein said control circuitry is implemented as a selected one of the set consisting of: hardware logic, software and processor logic, field programmable gate array (FPGA), application specific integrated circuit (ASIC), firmware or any combination thereof.

14. A homeostatic control system for dynamically determining inertial orientation of a body in three dimensions comprising:

an X-axis sensor system positioned in an X plane of said body and including at least three first sensors that sense acceleration and gravity in said X plane and at least three second sensors that sense acceleration only in said X plane;

a Y-axis sensor system positioned in an Y plane of said body and including at least three first sensors that sense acceleration and gravity in said Y plane and at least three second sensors that sense acceleration only in said Y plane;

a Z-axis sensor system positioned in a Z plane of said body and including at least one sensor that senses yaw in said Z plane; and

control circuitry operably connected to all of said sensor systems to process signals produced by said sensors in order to dynamically determine an inertial orientation of said body in three dimensions based on a continuous determination of true down.

15. An electrically powered flying saucer comprising:

a flying saucer body housing within said body at least four generally downwardly directed thrusters, each thruster mechanically powered by at least one permanent magnet motor that generates at least a portion of the mechanical power provided to said thruster by switching magnetic flux from at least one permanent magnet through at least one laminate; and

an electrical power source operably connected to said thrusters and carried within said body, said electrical power source having a current storage capacity and a weight that enable said saucer to achieve a lift to weight ratio of at least 2:1.

16. A radio controlled (RC) flying saucer remotely controlled by a hand-held RC controller, said RC flying saucer comprising:

a flying saucer body housing within said body at least four generally downwardly directed thrusters, said body being comprised of a foam material;

an electrical power source operably connected to said thrusters and carried within said body; and

control circuitry operably connected to said thrusters and said electrical power source, said control circuitry including a radio frequency (RF) transceiver providing two-way RF communications between said flying saucer and said hand-held RC controller.

17. A radio controlled (RC) flying saucer remotely controlled by a hand-held RC controller, said RC flying saucer comprising:

a flying saucer body housing within said body an even number N of ducted fans where N is greater than 2, each ducted fan oriented generally downward and at an angle of greater than 10 degrees and less than 15 degrees to vertical;

an electrical power source operably connected to said thrusters and carried within said body; and

control circuitry operably connected to said thrusters and said electrical power source, said control circuitry including a radio frequency (RF) receiver enabling RF communications from said hand-held RC controller to said flying saucer.

18. The RC flying saucer of claim 17 wherein each of said ducted fans comprises:

a duct assembly, said duct assembly including a motor mount;

a motor dimensioned to be received in said motor mount, said motor comprising an exterior rotating rotor and an interior fixed stator that is operably mountable in said motor mount; and

a fan blade operably mountable on said exterior rotating rotor.

19. The RC flying saucer of claim 18 wherein said fan blade comprises at least six blades extending from a central mounting hub that is generally concentrically aligned with said motor mount to an exterior ring that is attached to each blade.

20. The RC flying saucer of claim 16 wherein each ducted fan includes at least six blades that are angled at a constant attack angle across a chord of each blade, said attack angle being greater than 20 degrees and less than 40 degrees.

21. The RC flying saucer of claim 16 wherein each ducted fan comprises a two-piece duct assembly, including an upper duct portion and a lower duct portion, each duct portion having structure that mechanically mates with said flying saucer body and structure for mechanically mates with the other duct portion when said duct portions are assembled from opposite sides into said flying saucer body.

22. A radio controlled (RC) aircraft remotely controlled by a hand-held RC controller comprising:

said RC controller including:

a body adapted to be held in one hand;

a homeostatic control system positioned within said body to sense a desired orientation of said RC controller by a user selectively positioning an orientation of said RC controller, said homeostatic control system including an XYZ sensor arrangement and associated control circuitry that dynamically determines an inertial gravitational reference for use in sensing said desired orientation;

a bidirectional radio frequency (RF) transceiver providing two-way RF communications between said RC aircraft and said hand-held RC controller that communicates said desired orientation to said RC aircraft; and

said RC aircraft including:

at least one motor that provides motive force to said RC aircraft;

a power source operably connected to said at least one motor and carried within said RC aircraft;

a homeostatic control system operably connected to said at least one motor to automatically control said motor in order to maintain said desired orientation of said RC aircraft, said homeostatic control system including an XYZ sensor arrangement and associated control circuitry that dynamically determines an inertial gravitational reference for use in automatic control of said at least one motor; and

a bidirectional radio frequency (RF) transceiver providing two-way RF communications between said RC aircraft and said hand-held RC controller.